

IDS 2935 Secrets of Alchemy – Quest 1

Quest 1 Theme: Nature and Culture

General Education Designation: Humanities. A minimum grade of C is required for passing
Fall Semester 2022, August 24, 2022 – December 16, 2022.

Class Meeting Day/Time: [Lecture/Discussion: T7, R7; Labs T11-E1 or W11-E1 every other week]

Location: [Lecture: CCB221, Lab: CCB110]

Holidays/No Class: September 5 (Labor Day); October 7 (Homecoming); November 11 (Veteran's Day); November 23 – 25 (Thanksgiving); December 8 – 9 (Reading Days).

Final Exam Schedule: December 15, 2022 (10:00am – 12:00pm). Note: There will not be a final exam in this course but the final analytical essay will be due online on 12/15 at 12:00pm (noon).

I. Course Information

Who are we in relation to the natural world? How have humans understood their role in the natural world and their responsibility to it? How do portrayals of nature reflect our values or self-understanding? What is it that holds our world together at its core? What are the forces that drive it, what are the laws that govern it? These and similar questions have been asked by humans ever since they were able to reflect upon themselves and their environment. Trying to make sense of ourselves and our world was and is one of the major drivers of scientific as well as industrial and societal progress. Our modern world depends to a large extent on scientific insights accumulated over millennia. In the course of human history theories were developed to answer these fundamentally philosophical questions. They were based on observations of nature, they were revised, discarded, and replaced with new and better ones. Alchemy as a precursor to modern chemistry reflects this human desire of learning about nature and the ability to control it to our benefit. By studying the history of alchemy we can learn how people investigated the material world, how they developed theories that were founded in their historic worldviews, and how they tried to harness these insights for their benefit.

In this course we will look at alchemy as a proto-scientific endeavor that grew out of a mix of Greek philosophy and pagan belief systems, which developed into what is known as 'natural philosophy,' and ultimately laid the foundation for the modern science of chemistry. We will investigate questions such as: What was alchemy in the eyes of its practitioners? Who were the alchemists, and what did they believe and do? What were their goals, and what did they accomplish? How did their worldview affect their labor in the workshop? How did they envision their world and their work, and how were they seen by contemporaries? How did their work and their theories affect their own and our culture? We will investigate these questions in light of the more fundamental ones about how scientific knowledge is generated and how it led to a better understanding of our world. Looking at the historic development of alchemy will lead us to reflect on our modern scientific endeavor. How do our own worldviews and biases affect our modern scientific work? What are our own goals in developing science? Moreover, we will look at alchemy from a variety of interdisciplinary vantage points, the most obvious ones being history and modern chemistry. However, our discussion will include other fields of study such as art history, religion, literature, culture, world views, *etc.* In the end we hope to come to a better

Instructors (Note: stated office hours are tentative and will be updated the 1st week of classes)

Instructor	Dr. Alexander Angerhofer (Dr. A)
Phone	392 9489 (office, CLB318A), or 392 2123 (lab, CLB303)
E-mail	alex@chem.ufl.edu
O.H.	Periods M-3 on Zoom; W-7 and R-8 in person, CLB318A, or by appointment.

Grad. TA	Zain Becerra, (becerra@ufl.edu), OH: periods M–8, W–8, R–4 on Zoom.*
TAs	Sophia Brecko, (sophia.brecko@ufl.edu), OH: period M–9 on Zoom .*
	Alexandra (Ally) Cagle, (a.cagle@ufl.edu), OH: period M–4 on Zoom .*
	Rosenna Chan (rosenna.chan@ufl.edu), OH: period T–8 on Zoom .*
	Connor Griffiths (connorgriffiths@ufl.edu), OH: period T–2 on Zoom .*
	Alex Johnson (alexjohnson@ufl.edu), OH: period T–4 on Zoom .*
	Emerson Parks (emersonparks@ufl.edu), OH: period M–2 on Zoom .*

FALL 2022										SCHEDULE CARD	
UNIVERSITY OF FLORIDA											
				NAME: IDS2935 Office Hours							
				Univ. Address:				Univ. Phone:			
er.	Hour	Monday	Bldg/Rm #	Tuesday	Bldg/Rm #	Wednesday	Bldg/Rm #	Thursday	Bldg/Rm #	Friday	Bldg/Rm #
1	7:25-8:15										
2	8:30-9:20	Emerson	Zoom	Connor	Zoom						
3	9:35-10:25	Dr. A	Zoom								
4	10:40-11:30	Ally C.	Zoom	Alex J.	Zoom			Zain	Zoom		
5	11:45-12:35 p										
6	12:50-1:40										
7	1:55-2:45			IDS 2935	CCB221	Dr. A	CLB318A	IDS 2935	CCB221		
8	3:00-3:50	Zain	Zoom	Rosenna	Zoom	Zain	Zoom	Dr. A	CLB318A		
9	4:05-4:55	Sophia	Zoom								
0	5:10-6:00										
1	6:15-7:05										
-1	7:20-8:10										
-2	8:20-9:10										
-3	9:20-10:10										
Comments:		Zoom Office hours will be held at https://ufl.zoom.us/j/96320318806 .									
		Note: Dr. A's W-7 and R-8 period office hours are available both on zoom and in person at his CLB318A office.									

Course Description

This interdisciplinary Quest 1 course explores the question of how we as human beings see the natural world, through the lenses of history and chemistry. Alchemy as the pre-cursor of modern chemistry has been practiced as early as ~300 CE until it was mostly replaced as a scientific and cultural driving force by modern chemistry about three centuries ago. In their quest for understanding the forces of nature and learning how to harness them, alchemists are similar to our modern scientists. However, they were children of their age and worked with the worldviews and biases of their times. Looking at the world through their eyes will help us understand how our own worldviews and biases affect our quest for knowledge and desire to control the natural world. The history of alchemy with its many secrets draws us to look back and enables us to look forward.

Students will read the book ‘The Secrets of Alchemy’ by Larry Principe (Drew Professor of History of Science at Johns Hopkins University) to get a historic overview of the four periods of alchemy, the Greco-Egyptian, Arabic, Medieval Latin, and Early Modern eras. The book will be supplemented with further reading material which discusses both ancient and modern sources of alchemy, its foundational theories, practical aspects, and also includes Eastern Alchemy.

The course includes a laboratory component with six experiments that will introduce students to some of the methods and techniques used by alchemists in their workshops.

At the end of the semester students will give a short conference-style (5 – 7 min) presentation on a topic of their choice from the various themes and ideas discussed in class. The presentation will be peer-reviewed and (partially) peer-graded. The topic of the presentation has to be approved by the instructor.

Instead of a final exam students will write an analytical essay which will be due online on canvas during final exam week on the course’s final exam date, December 15, 2021, at 12:00pm (noon). Students may choose among different themes for their essays. They may focus on alchemy as a cultural force, or on its historical development as a precursor of modern chemistry, or how alchemical theory was biased by worldviews. Other themes may be the philosophical and religious roots of alchemy or an analysis of the actual chemistry that alchemists practiced in their workshops. Please review your chosen theme with the instructor before beginning to work on it.

Humanities (H)

Humanities courses provide instruction in the history, key themes, principles, terminology, and theory or methodologies used within a humanities discipline or the humanities in general. Students will learn to identify and to analyze the key elements, biases and influences that shape thought. These courses emphasize clear and effective analysis and approach issues and problems from multiple perspectives.

Required & Recommended Course Materials (to purchase/rent)

Required Books:

[PrincipleLM2013] Lawrence M. Principe, 'The Secrets of Alchemy,' The University of Chicago Press, Chicago/IL, 2013, ISBN #978-0-226-10379-2.

Recommended Books:

[HolmyardEJ1957] Eric John Holmyard, 'Alchemy,' reprinted 1990, Dover Publications, Mineola/NY 1990, ISBN #978-0-48626-298-7. Reading assignments from this book will be made available to students on canvas at no cost.

Other Source Material:

Other source material as listed under 'Readings/Works' will be made available online through canvas at no cost to the student.

Lab Materials:

Approved safety glasses/goggles and proper attire. You will be asked to leave the lab if you don't show up in proper attire. Rules conform to those used in General Chemistry Labs (see below).

You will require a suitable laboratory notebook. A standard composition notebook is sufficient. All UF students are expected to satisfy the UF computing requirement and have access to a computer with an internet connection. There are no Materials and Supplies Fees.

Lab Safety: Dress Code



This is Daniel:

Daniel is dressed properly for lab.

- His hair is tied back (if applicable)
- His **approved** safety glasses are on
- His **approved** mask is being worn
- He is not wearing any dangling jewelry
- He is wearing a loose fitting shirt
- His shirt sleeves cover at least to the mid-upper arm
- His shirt will cover his torso when he raises his arms
- His pants are loose fitting and cover his ankles (no gap between shoes and pants)
- He is wearing closed toed shoes that cover his whole foot.



II. Coursework & Schedule

1. List of Graded Work

Assignment	Description	Requirement	Points
Online Discussion Points (ODP)	Online Discussion Posts. Post questions and ideas you wish to discuss in the discussion meetings pertaining to the weekly readings. Submit on canvas. You will receive a grade on the 10 best of 13 opportunities.	200 words minimum per week	100 (10×10)
In-Class Participation Grade (ICP)	Will be earned by actively participating in class during the weekly discussions during week 2 through 15. There are 13 opportunities to participate actively. You will receive a grade on the 10 best of these 13 opportunities.		100 (10×10)
Literature Review (LRev)	Brief summary and synopsis of a paper from the current literature on the history of alchemy. Students can choose from approx. 20 – 30 articles provided by the instructor. Submit on canvas.	400–600 words	100 (1×100)
Laboratory Participation (LP)	Actively participate in the experiential learning portion of the course (alchemy labs).		60 (6×10)
Brief Lab Report (LR) Experiential Learning	Brief report on the laboratory activities. The report should contain an introduction, the purpose of the experiment, and a description of what was done and what the results were. You will receive a grade on the 4 best out of 5 lab reports.	2 – 4 pages double spaced including figures	200 (4×50)
Student Presentation (SP)	5 – 7 minute oral presentation on a topic of student's choice approved by the instructor. Students will present in class during the T11-E1 and W11-E1 lab periods during the last two weeks of the semester. Presentations will be peer-reviewed/graded.	5 – 7 min oral presentation	200 (1×200)
Final Analytical Essay	Your essay will analyze some of the important questions that were raised in the course. The topic of your essay will have to be approved by your instructor. The topics for the final essay and the student presentation may be the same.	800 – 1200 words	240 (1×240)
Total:			1000

2. Weekly Course Schedule

Week/ Date	Activity	Topic/Assignment	Assigned Work Due
Week 1			
Aug. 25	Syllabus	Introduction: Syllabus, discussion of logistics, introduction of book.	
Aug. 25	Lecture	Overview of Ancient Technology/Chemistry	
Week 2			
Aug. 30	Lecture	Hellenistic Philosophy – The philosophical and theoretical underpinnings of alchemy in the works of Aristotle, Democritus, and the Pythagoreans.	
	Readings/Works	[HolmyardEJ1957] chapter 1, pp. 15 – 24	
Sep. 01	Lecture	Beginnings of Alchemy, Greco-Egyptian Chemeia	
	Readings/Works	[PrincipeLM2013] Prolog and Chapter 1, pp. 1 – 26. [DufaultO2015] Transmutation Theory in the Alchemical Corpus, Ambix 62 (2015) 215 – 244.	
Week 3			
Sep. 06	Assignment	Online discussion post on reading material from prior week.	ODP #1 due on canvas at 8:00am.
Sep. 06	In-Class Discussion	Review of 2 nd week reading materials and posted discussion points.	ICP #1 in class
Sep. 06/07	Lab #1	Sulfur Water – A recipe from the Greco-Egyptian period (Leyden payrus X) to tinge silver with a gold color.	LP #1, lab periods T11-E1/W11-E1
Sep. 08	Lecture	The second wave, Arabic ‘Al-Kimiya.’ How did the Arabs learn about Greek alchemy? How did they reinterpret alchemical theories in light of their own worldviews and the Islamic religion? What new insights did they contribute?	
	Readings/Works	[PrincipeLM2013] Chapter 2, pp. 27 – 50. [MartelliM2017] Translating Ancient Alchemy: Fragments of	

Week/ Date	Activity	Topic/Assignment	Assigned Work Due
		Graeco-Egyptian Alchemy in Arabic Compendia, Ambix 64 (2017) 326 – 342.	
Week 4			
Sep. 12	Assignment	Online discussion post on reading material from prior week.	ODP #2 due on canvas at 10:00am
Sep. 13	In-Class Discussion	Review of 3 rd week reading materials and posted discussion points.	ICP #2 in class
Sep. 15	Lecture	An independent development, Eastern Alchemy. How did Chinese philosophy lead to alchemical theories? How were they similar and different from those in the western world? What were the goals of Eastern alchemy as opposed to those in the West?	
	Readings/Works	[HolmyardEJ1957] Chapter 3, pp. 33 – 42. [PregadioF2012] The Way of the Golden Elixir – An Introduction to Taoist Alchemy, 2 nd ed., Golden Elixir Press 2014.	
Week 5			
Sep. 19	Assignment	Online discussion post on reading material from prior week.	ODP #3 due on canvas at 10:00am
Sep. 20	Discussion	Review of 4 th week reading materials and posted discussion points.	ICP #3 in class
Sep. 20/21	Lab #2	Copper → Silver → Gold. Transmutations in the lab, or so it seems.	LP #2, lab periods T11-E1/W11-E1
Sep. 20/21	Assignment	Lab Reports for Lab #1 are due at beginning of lab period on canvas.	LR #1, due on canvas, T10/W10.
Sep. 22	Lecture	The third wave, medieval Latin ‘Alchemia.’ What was it that drew European thinkers back to alchemy as they were coming out of the dark ages? What were their sources? How were they able to balance ancient Greek philosophy, pagan roots, Muslim influence, and their own strictly Catholic faith to synthesize new theories and practices? What was the relationship between alchemists and the ruling	

Week/ Date	Activity	Topic/Assignment	Assigned Work Due
		Catholic Church?	
	Readings/Works	[PrincipeLM2013] Chapter 3, pp. 51 – 82. [HaaningA2006] The Philosophical Nature of Early Western Alchemy – The Formative Period c. 1150 – 1350, in Art & Alchemy, ed. J. Wamberg, Museum Tusculanum Press, Copenhagen 2006.	
Week 6			
Sep. 26	Assignment	Online discussion post on reading material from prior week.	ODP #4 due on canvas at 10:00am
Sep. 27	Discussion	Review of 5 th week reading materials and posted discussion points.	ICP #4 in class
Sep. 29	Lecture	The Golden Age of Alchemy, Early Modern Period ‘Chymistry.’ Looking back at the early modern period what was the draw that alchemy had for people despite mounting criticisms from the developing science of chemistry? Why did scientists like Isaac Newton or Joseph Boyle practice alchemy while at the same time developing the foundations of modern chemistry and physics? How did scientific knowledge change during this period?	
	Readings/Works	[PrincipeLM2013] Chapter 5, pp. 107 – 136. [PrincipeLM2019] The Development of the Basil Valentine Corpus and Biography: Pseudoepigraphic Corpora and Paracelsian Ideas, Early Science and Medicine 24 (2019) 549 – 572.	
Week 7			
Oct. 03	Assignment	Online discussion post on reading material from prior week.	ODP #5 due on canvas at 10:00am
Oct. 04	Discussion	Review of 6 th week reading materials and posted discussion points.	ICP #5 in class
Oct. 04/05	Lab #3	Prussian Blue, an alchemical pigment, and Mauveine, the first industrial chemical dye.	LP #3, lab periods T11-E1/W11-E1
Oct. 04/05	Assignment	Lab Reports for Lab #2 are due at beginning of lab period on canvas.	LR #2, due on

Week/ Date	Activity	Topic/Assignment	Assigned Work Due
			canvas, T10/W10.
Oct. 06	Lecture	Gold and its importance in Alchemy. What did the alchemists do to transmute base metals into gold? What was the theory behind their attempts? Was there ever any success? What happened when they failed?	
	Readings/Works	[KauffmanGB1985] The Role of Gold in Alchemy. Parts I – III, Gold Bulletin 18 (1985) 31 – 44, 69 – 78, 109 – 119. [KarpenkoV2007] Not All That Glitters is Gold: Gold Imitations in History, Ambix 54 (2007) 172 – 191.	
Week 8			
Oct. 10	Assignment	Online discussion post on reading material from prior week.	ODP #6 due on canvas at 10:00am
Oct. 11	Discussion	Review of 7 th week reading materials and posted discussion points.	ICP #6 in class
Oct. 13	Lecture	The Secrets of Alchemy. What did the alchemists actually do in their workshop? How can their sometimes mystical writings be interpreted in terms of material processes? What experiments did they carry out and what were their results? How did their work affect the way they generated new theories?	
	Readings/Works	[PrincipeLM2013] Chapter 6, pp. 137 – 171. [MartelliM2011] Greek Alchemists at Work: ‘Alchemical Laboratory’ in the Greco-Roman Egypt, Nuncius 26 (2011) 271 – 311.	
Week 9			
Oct. 17	Assignment	Online discussion post on reading material from prior week.	ODP #7 due on canvas at 10:00am
Oct. 18	Discussion	Review of 8 th week reading materials and posted discussion points.	ICP #7 in class
Oct. 18/19	Lab #4	Prussian Blue, part 2, and Cochineal Dye, a red pigment harvested	LP #4, lab periods

Week/ Date	Activity	Topic/Assignment	Assigned Work Due
		from farmed bugs in the New World.	T11-E1/W11-E1
Oct. 18/19	Assignment	Lab Reports for Lab #3 are due at beginning of lab period on canvas.	LR #3, due on canvas, T10/W10.
Oct. 20	Lecture	Iatrochemistry – the turn away from Galen and toward medicinal alchemy and chemistry. What was the theoretical and practical basis for the developments of mineral-based cures? We will look at the persona of Paracelsus, perhaps the most prominent iatrochemist of his time. We will look at the recipe literature and the way that noble women practiced medicinal alchemy.	
	Readings/Works	[HolmyardEJ1957] Chapter 8, pp. 165 – 176. [BernoulliR1994] Paracelsus – physician, reformer, philosopher, scientist, <i>Experientia</i> 50 (1994) 334 – 338. [HedesanG2018] “It All Depends on the Dose” – Poisons and Medicines in European History, ed. O.P. Grell et al., Chap. 5, Routledge 2018.	
Oct. 21	Assignment	Literature Review (between 400 and 600 words) on an article of your choice from a list of articles provided by the instructor.	LRev due on canvas at 6:00pm.
Week 10			
Oct. 24	Assignment	Online discussion post on reading material from prior week.	ODP #8 due on canvas at 10:00am
Oct. 25	Discussion	Review of 9 th week reading materials and posted discussion points.	ICP #8 in class
Oct. 27	Lecture	Wider Context of Alchemy in Culture. How did alchemy as an art and as a technology shape culture? Where do we find hints about alchemy in our modern language and thoughts? How did people in the past and now view the profession of the alchemist?	
	Readings/Works	[PrincipeLM2013] Chapter 7 and Epilogue, pp. 173 – 210. [ChaucerG1387] ‘The Canon’s Yeoman’s Tale,’ translated to	

Week/ Date	Activity	Topic/Assignment	Assigned Work Due
		modern English, accessible at: https://chaucer.fas.harvard.edu/pages/text-and-translations . [MaierM1618] 'Atalanta Fugiens,' translated to English, available as a digital edition, 'furnace and fugue,' ed. By Tara Nummedal and Donna Bilak, https://furnaceandfugue.org/ , pp. 1 – 50.	
Week 11			
Oct. 31	Assignment	Online discussion post on reading material from prior week.	ODP #9 due on canvas at 10:00am
Nov. 01	Discussion	Review of 10 th week reading materials and posted discussion points.	ICP #9 in class
Nov. 01/02	Lab #5	Essential oils by vapor distillation using a copper alembic built after a design by da Vinci and a modern adaptation (to speed up the process).	LP #5, lab periods T11-E1/W11-E1
Nov. 01/02	Assignment	Lab Reports for Lab #4 are due at beginning of lab period on canvas.	LR #4, due on canvas, T10/W10.
Nov. 03	Lecture	Focus on Alchemy in the visual arts including early depictions of alchemical symbols and apparatuses, emblems and illustrations in alchemical books, engravings, paintings, and surrealistic images. How did alchemy get propagated by pictures? How did popular culture and the artists depict alchemy and alchemists? Were they shown in a positive or negative light? What do we learn from the paintings about the cultural settings in which alchemy was practiced and how it was viewed by the larger population in a given culture?	
	Readings/Works	[PrincipeLM2002] Transmutations: Alchemy in Art – Selected Works from the Eddleman and Fisher Collections at the Chemical Heritage Foundation, Chemical Heritage Foundation, Philadelphia/PA, 2002, pp. 1 – 35. [HeydM1984] 'Dali's Metamorphosis of Narcissus Reconsidered,' <i>Artibus et Historiae</i> , 5 (1984)121 – 131.	

Week/ Date	Activity	Topic/Assignment	Assigned Work Due
		[DixonLS1981] 'Bosch's Garden of Delights Triptych: Remnants of a "Fossil" Science,' The Art Bulletin 63 (1981) 96 – 113.	
Week 12			
Nov. 07	Assignment	Online discussion post on reading material from prior week.	ODP #10 due on canvas at 10:00am
Nov. 08	Discussion	Review of 11 th week reading materials and posted discussion points.	ICP #10 in class
Nov. 10	Lecture	Women in Alchemy. Given the strict gender roles during the times and in the cultures where alchemy was practiced it is surprising to find female alchemists. What contributions and inventions derive from female alchemists? Why were they interested in alchemy? What challenges did they have to overcome? How was their work received by their contemporaries? What is their legacy?	
	Readings/Works	[RayMK2015] Daughters of Alchemy, Chapter 1 – pp. 15 – 45. [NummedalTE2001] Alchemical Reproduction and the Career of Anna Maria Zieglerin, Ambix 48 (2001) 56 – 68.	
Week 13			
Nov. 14	Assignment	Online discussion post on reading material from prior week.	ODP #11 due on canvas at 10:00am
Nov. 15	Discussion	Review of 12 th week reading materials and posted discussion points.	ICP #11 in class
Nov. 15/16	Lab #6	Tie-Dye T-shirt day. We will use our alchemical dyes to make our own T-shirts. No lab report will be necessary for this lab.	LP #6, lab periods T11-E1/W11-E1
Nov. 15/16	Assignment	Lab Reports for Lab #5 are due at beginning of lab period on canvas.	LR #5, due on canvas, T10/W10.
Nov. 17	Lecture	Alchemical Discoveries. What inventions were made by the alchemists? How were they able to commercialize their work and their products? How did these discoveries contribute to the development of our modern society?	

Week/ Date	Activity	Topic/Assignment	Assigned Work Due
	Readings/Works	<p>[KrafftF1969] Phosphorus – From Elemental Light to Chemical Element, <i>Angew. Chemie</i> 8 (1969) 660 – 671.</p> <p>[TaapeT2014] Distilling Reliable Remedies: Hieronymus Brunschwig's <i>Liber de arte distillandi</i> (1500) Between Alchemical Learning and Craft Practice, <i>Ambix</i> 61 (2014) 236 – 256</p> <p>[ZecchinaA2014] The role of alchemy and chemistry in painting evolution, <i>Rend. Fis. Acc. Lincei</i> 25 (2014) 265 – 273.</p>	
Week 14			
Nov. 22	Make-up Lab Day	Your chance to make up earlier missed and excused labs	Lab periods T11-E1
Week 15			
Nov. 28	Assignment	Online discussion post on reading material from week 13.	ODP #12 due on canvas at 10:00am
Nov. 29	Discussion	Review of 13 th week reading materials and posted discussion points.	ICP #13 in class
Nov. 29/30	Assignment	5 – 7 min. Student Presentation on a topic of student's choice (has to be approved by instructor), will be peer graded.	SP in CCB221, T11-E1/W11-E1.
Dec. 01	Lecture	Alchemy has been rediscovered in popular culture, mostly as a caricature , <i>e.g.</i> , Harry Potter, Fullmetal Alchemist, <i>etc.</i> It still maintains an influence on modern chemistry and psychology but is also present in some forms of pseudo-science, esotericism, and the occult. The transmutation of elements has been achieved by science using large accelerator facilities and new (unstable) elements are still being made and probed. What has survived of alchemy in contemporary pop culture? How has the picture of the alchemist changed? Are there still people trying to practice it? Have the goals of alchemy been realized by modern technology?	
	Readings/Works	[PrincipeLM2013] Chapter 4, pp. 83 – 106.	

Week/ Date	Activity	Topic/Assignment	Assigned Work Due
		[MartinL1975] A History of the Psychological Interpretation of Alchemy, Ambix 22 (1975) 10 – 19. [SherrR1941] ‘Transmutation of Mercury by Fast Neutrons,’ Physical Review 60 (1941) 473 – 479.	
Week 16			
Dec. 05	Assignment	Online discussion post on reading material from Tuesday.	ODP #13 due on canvas at 10:00am
Dec. 06	Discussion	Review of 15 th week reading materials and posted discussion points.	ICP #13 in class
Dec. 06/07	Assignment	5 – 7 min. Student Presentation on a topic of student’s choice (has to be approved by instructor), will be peer graded.	SP in CCB221, T11-E1/W11-E1.
Week 17			
Dec 15	Assignment (Final)	Analytical Essay on topic of student’s choice related to the course material (has to be approved by instructor).	Due on 12/15/22 at 12:00pm (noon) on canvas.

III. Grading

3. Statement on Attendance and Participation

Attendance and Participation: Requirements for class attendance, make-up assignments, and other work in this course are consistent with university policies that can be found at: <https://catalog.ufl.edu/UGRD/academic-regulations/attendance-policies/>

Attendance: In-class participation will be documented with attendance sheet. Without consistent attendance and in-class participation it will be very difficult for you to succeed in the course.

Participation: Consistent informed, thoughtful, and considerate class participation is expected and will be evaluated using the rubric below. The instructor will inform you of your participation grade to date at least every other week and schedule a conference if you are earning below 70% of the possible points.

NOTE: If you have personal issues that prohibit you from joining freely in class discussion, *e.g.*, shyness, language barriers, *etc.*, see the instructor as soon as possible to discuss alternative modes of participation.

Written Assignments: Grade Rubric applies to Online Discussion Points (ODP), Literature Review (LRev), Lab Reports (LR), and Final Essay.

	High Quality	Average	Needs Improvement	Unacceptable
Informed: Shows evidence of having read the material	100 %	75 %	50 %	0 %
Thoughtful: Shows evidence of having understood and considered issues raised.	100 %	75 %	50 %	0 %
Reflective: Provides a component of self-reflection that is sincere.	100 %	75 %	50 %	0 %
Complete: Responses are complete and/or consistent with the instructions. Responses also utilize appropriate grammar	100 %	75 %	50 %	0 %

Participation: Grade Rubric applies to in-class participation (ICP).

	High Quality	Average	Unacceptable
Informed: Shows evidence of having done the assigned work.	100%	50%	0%
Thoughtful: Shows evidence of having understood and considered issues raised.	100%	50%	0%
Considerate: Takes the perspective of others into account.	100%	50%	0%

Laboratory Participation (LP) Grade Rubric:

	High Quality	Average	Unacceptable
Informed: Shows evidence of having read the lab manual	100%	50%	0%
Careful: Carefully follow experimental steps and pay attention to lab safety.	100%	50%	0%
Notes: Careful notes taken during the lab work on procedures and events.	100%	50%	0%

Peer Grading:

Student presentations (SP) will be peer graded based on the rubric below. Students in the audience will assign points to each speaker during a session based on the quality of the presentation. Student grades will be averaged for each speaker and count for 50% of the presenter's grade. The remaining 50% will come from the instructor's and TAs' assessments of the presentation using the same rubric as the students.

Student Presentation Rubric for Peer-grading

Presenter Name: _____ Presentation Title: _____ Date: _____

Time presentation began: _____ Time presentation ended: _____

Criteria (graded on a scale from 1 – 10)	10	7	4	1	Pts. earned
Content (accuracy, based on own research, new material, clarity of arguments) (max 40 pts)	Content presented is accurate and based on own research and new material is presented; there is a clear logical flow, essential information is emphasized.	Content appears accurate with some evidence of own research and some new material; there is a logical flow to the arguments presented.	Some content facts seem questionable with little evidence of own research and almost no new material presented; arguments don't follow a logic path.	Content seems questionable; no evidence of own research, no new material presented; no logical path throughout the presentation.	
Form (Introduction, body, conclusion, and references) (max 40 pts)	Presentation starts with a short and engaging introduction, body contains several well structured points, and ends with a brief rational conclusion and references. I	Presentation follows the main structure and has all parts but misses transitions or the parts are out of proportion.	Several important parts (introduction, body, conclusion, references) are missing, out of order, mixed together, or are out of proportion.	No perceptible introduction, body, or conclusion. Reference list is missing.	
Presentation (clarity, audibility, eye contact, verbal fillers) (max 40 pts)	Presenter is articulate, audible to the people in the back row, maintains eye contact with the audience, and avoids verbal fillers (um, uh, er, etc.) and unnecessary pauses while maintaining an engaging flow.	Presenter is audible to all most of the time, maintains eye contact with many in the audience, and uses very few verbal fillers or unnecessary pauses.	Presenter mumbles or is sometimes difficult to hear in the back row, eye contact with the audience is sparse, flow is interrupted by pauses and/or verbal fillers, flow of the presentation is choppy.	Presenter constantly mumbles or speaks so softly that the back row can't hear, eye contact is lacking, speaker reads off text from powerpoint slides, presentation is constantly interrupted by pauses and/or verbal fillers.	
Visual Aid (engaging, not dominating, neat, creative powerpoint slides) (max 40 pts)	The visual aid complements the speech and is neat (no typos), colorful, and creative. Text is sparse and has large font for good readability.	The visual aid connects to the speech and is mostly neat, colorful, and creative. Text fonts could be bigger and amount of text less to avoid distraction.	The visual aid somewhat connects to the speech and is somewhat neat and colorful but lacks creativity or dominates the presentation. There is too much text and/or fonts are too small.	The visual aid lacks connection with the presentation and is messy, creativity is lacking, consists of just words.	
Confidence & Attitude (enthusiasm, poise, body language, engaging) (max 20 pts)	Speaks with enthusiasm and poise, body language supports the flow of the presentation, audience is engaged.	Speaks mostly with enthusiasm and poise, body language supports the flow of the presentation most of the time, audience is mostly engaged.	Speaks with some enthusiasm and poise, body language is disconnected from presentation, audience is somewhat engaged.	Speaks with little or no enthusiasm and poise, body language distracts from the flow of the presentation, audience is unengaged.	
Time (max 20 pts)	Speech is within the allotted time (5 - 7 min)	Speech is either too short or too long (\pm 30 sec)	Speech is either too short or too long (5 min \pm 1 min)	Speech is either too short or too long (less than 4 min or has to be stopped because > 6 min)	
Total Points:					

4. Grading Scale

For information on how UF assigns grade points, visit: <https://catalog.ufl.edu/UGRD/academic-regulations/grades-grading-policies/>

A	94 – 100% of possible points	C	74 – 76%
A–	90 – 93%	C–	70 – 73%
B+	87 – 89%	D+	67 – 69%
B	84 – 86%	D	64 – 66%
B–	80 – 83%	D–	60 – 63%
C+	77 – 79%	E	<60%

Grades will be rounded up to integer percentage points before letter grades are calculated. Do not rely on the canvas gradebook for your letter grade! Your letter grade will be calculated strictly based on the rules in this syllabus.

IV. Quest Learning Experiences

5. Details of Experiential Learning Component

Students will participate and carry out work in the six lab components over the course of the semester. The labs are designed to topically relate to some of the material discussed in class. Students will see the work of the alchemists through their eyes to some extent by following in their footsteps and working on some of their recipes. Each lab requires the writing of a brief lab report which is due two weeks after the lab work has been completed.

6. Details of Self-Reflection Component

Students will reflect on the reading material provided each week and share their thoughts both through in-class discussion participation as well as by posting discussion paragraphs (ODPs) on canvas. These activities will be due weekly. Deeper self reflection will happen as the student prepares for their end-of-semester presentation (SP) and their Final Essay. Grading Scale

V. General Education and Quest Objectives & SLOs

7. This Course's Objectives—Gen Ed Primary Area and Quest

Humanities + Quest 1 + Course Objectives

Humanities Objectives	Quest 1 Objectives →	This Course's Objectives →	Objectives Accomplished By:
Humanities courses provide instruction in the history, key themes, principles, terminology, and theory or methodologies used within a humanities discipline or the humanities in general.	Address the history, key themes, principles, terminologies, theories, and methodologies of various arts and humanities disciplines that enable us to ask essential questions about the human condition.	Explore the history of alchemy over the last ~2,000 years as part of natural philosophy which was the study of nature and natural laws before the advent of modern science. Principles, theories, and methodologies were rooted in Greek philosophy and their application reveals how the worldview, religion, and biases of their time affected alchemists in their search for knowledge.	The course explores the worldviews and religious biases of the alchemists. It introduces students to aspects of Greek philosophy which formed the root of alchemical theory, it will explore the methodologies, both theoretical and practical, used by alchemists. It will show alchemy to be part of the wider human endeavor to make sense of the world around them and to utilize it to advance culture.
Students will learn to identify and to analyze the key elements, biases, and influences that shape thought.	Present different arts and humanities disciplines' distinctive elements, along with their biases and influences on essential questions about the human condition.	History (of science but also world history and cultural history), philosophy (both classical Greek philosophy as well as natural philosophy), religion (gnosticism, early Christianity, Islam, Catholicism, Eastern religions all play their roles), and science (through observation and reflection) all play a role in the development of alchemy and will be examined in this course.	Students will read the textbook and instructor-supplied reading materials and participate in active in-class discussion on questions raised by its interdisciplinary approach to the art of alchemy. Students will engage in their own research using the peer-reviewed literature to prepare a 5–7 minute presentation on a topic of the student's choice.

Humanities Objectives	Quest 1 Objectives →	This Course's Objectives →	Objectives Accomplished By:
	Explore at least one arts or humanities resource outside their classroom and explain how engagement with it complements classroom work.	Expose students to the dimension of the visual arts and its connection with alchemy and the alchemists.	Students will discuss and reflect on historic paintings depicting alchemical themes as well as on the many . Students will discuss medieval emblems and other artistic devices and decode their alchemical messages.
These courses emphasize clear and effective analysis and approach issues and problems from multiple perspectives.	Enable students to analyze and evaluate essential questions about the human condition clearly and effectively in writing and other forms appropriate to the discipline.	Alchemy was always a practical art. It attempted to make sense of observations by describing them with ancient philosophical ideas about nature. The quest for knowledge and exploitation of natural laws will be investigated both from the point of view of classical natural philosophy as well as modern science.	Students will participate in six laboratory sessions (one to two periods in length) to see and experience nature in a similar way as the alchemists did in their workshops.
	Analyze the role arts and humanities play in the lives of individuals and societies and the role they might play in students' undergraduate degree programs and lives after college.	Expose students to the wider connection between alchemy and culture.	Students will reflect on the way alchemy and alchemists were depicted in the arts (visual, theatrical, and audio) of their time. Connections will be drawn to modern culture and how alchemy has made a comeback (e.g., Harry Potter, Anime, ...).

**8. This Course's Student Learning Outcomes (SLOs)—Gen Ed Primary Area and Quest
Humanities + Quest 1 + Course SLOs**

	Humanities SLOs → Students will be able to...	Quest 1 SLOs → Students will be able to...	This Course's SLOs → Students will be able to...	Assessment Student competencies will be assessed through...
Content	Identify, describe, and explain the history, underlying theory and methodologies used.	Identify, describe, and explain the history, theories, and methodologies used to examine essential questions about the human condition within and across the arts and humanities disciplines incorporated into the course.	Identify, describe, and explain the historical evolution of alchemy over the course of almost 17 centuries. This includes alchemical processes and apparatus as well as the classical theories of nature that governed the practical work done in the workshops. They will be able to recognize several prominent alchemists and describe their school of thought (specifically, Zosimos, Jabir, Paracelsus, Starkey).	Class participation through active discussion, online discussion posts, an in-depth oral presentation on a topic of their choice, and a final paper exploring aspects of alchemy.
Critical Thinking	Identify and analyze key elements, biases and influences that shape thought within the subject area. Approach issues and problems within the discipline from multiple perspectives.	Analyze and evaluate essential questions about the human condition using established practices appropriate for the arts and humanities disciplines incorporated into the course.	Analyze and Evaluate the theories established in ancient Greece that provided the basis for natural philosophy throughout the ancient, medieval, and into the early modern periods. Students will be able to explain how ancient designs of chemical apparatus worked and use them to 'see through the eyes of the alchemist' by experiencing the same effects in the lab.	Class participation, in the lab portion of the course, lab reports will be due two weeks after each lab.

	Humanities SLOs → Students will be able to...	Quest 1 SLOs → Students will be able to...	This Course's SLOs → Students will be able to...	Assessment Student competencies will be assessed through...
Communication	Communicate knowledge, thoughts and reasoning clearly and effectively.	Develop and present clear and effective responses to essential questions in oral and written forms as appropriate to the relevant humanities disciplines incorporated into the course.	... research topics of interest in the history of alchemy and present them in oral and written form.	Students will present online discussion posts, a written literature review, an analytical essay, and an oral presentation.
Connection	N/A	Connect course content with critical reflection on their intellectual, personal, and professional development at UF and beyond.	... recognize how worldviews and biases shape the development of scientific theory and experiment.	Class participation through active discussion, online discussion posts, and an in-depth oral presentation on a topic of their choice, A final analytical essay will allow the students to present their understanding of one of several major themes of the course.

VI. Policies and Information

10. Students Requiring Accommodation

Students with disabilities who experience learning barriers and would like to request academic accommodations should connect with the disability Resource Center by visiting <https://disability.ufl.edu/students/get-started/>. It is important for students to share their accommodation letter with their instructor and discuss their access needs, as early as possible in the semester.

11. UF Evaluations Process

Students are expected to provide professional and respectful feedback on the quality of instruction in this course by completing course evaluations online via GatorEvals. Guidance on how to give feedback in a professional and respectful manner is available at <https://gatorevals.aa.ufl.edu/students/>. Students will be notified when the evaluation period opens, and can complete evaluations through the email they receive from GatorEvals, in their Canvas course menu under GatorEvals, or via <https://ufl.bluera.com/ufl/>. Summaries of course evaluation results are available to students at <https://gatorevals.aa.ufl.edu/public-results/>.

12. University Honesty Policy

UF students are bound by The Honor Pledge which states, “We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honor and integrity by abiding by the Honor Code.” On all work submitted for credit by students at the University of Florida, the following pledge is either required or implied: “On my honor, I have neither given nor received unauthorized aid in doing this assignment.” The Honor Code (<https://www.dso.ufl.edu/sccr/process/student-conduct-honor-code/>) specifies a number of behaviors that are in violation of this code and the possible sanctions. Furthermore, you are obligated to report any condition that facilitates academic misconduct to appropriate personnel. If you have any questions or concerns, please consult with the instructor or TAs in this class.

13. Counseling and Wellness Center

Contact information for the Counseling and Wellness Center: <https://counseling.ufl.edu/>, 392-1575; and the University Police Department: 392-1111 or 9-1-1 for emergencies.

14. The Writing Studio

The writing studio is committed to helping University of Florida students meet their academic and professional goals by becoming better writers. Visit the writing studio online at <http://writing.ufl.edu/writing-studio/> or in 2215 Turlington Hall for one-on-one consultations and workshops.

I am looking forward to spending the semester with you and introducing you to the secrets of alchemy. If you have further questions, please contact me. Have a great semester!

Sincerely Yours,

Dr. Alexander Angerhofer (Dr. A)